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Paleosols from the urzhumian (Middle permian) reference section, Kazan Volga region, Russia

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Abstract

© SGEM2018. Paleosol profiles from the reference section of the Urzhumian stage of Middle Permian in the Cheremushka Ravine, the Kazan Volga region, were studied in order to detail the paleogeographic and palaeoclimatic conditions. Field and laboratory methods, including grain size analysis, optical microscopy, X-ray fluorescence of siliciclastics, X-ray diffraction of clayey component, were used. Urzhumian succession of 70 m thick is represented by red-bed fluvial-lacustrine deposits with predominance of mudstones. The upper part of succession contains 17 paleosol profiles, 0.5-1.5 m thick, hosted in red mudstones, which are represented mostly by vertisols and calcisols. Sedimentological and geochemical (chemical index of alteration and other) features of studied paleosols indicate the simultaneity of sedimentation and pedogenesis (cumulative paleosols) in the depositional settings of low, periodically flooded plains. Pedofeatures, including in situ roots, slickensides, calcareous nodules, spots of gleization, and blocky peds, indicate the overall semi-arid paleoclimate with clear seasonality of precipitation. The mean annual precipitation, estimated from the depth to carbonate horizon (Bk), is 300-500 mm/year. Most of the paleosols in the section are weakly and moderately developed; the strong developed paleosols with calcrete horizons occur in the narrow interval within the Mid-Upper Urzhumian, where they form stacking paleosol, or pedocomplex, of 3.5-4.0 m thick. The same interval contains the high diverse non-marine fauna of osracods, bivalves, fish and tetrapods. This are interpreted as relative tectonic stability, when the rate of pedogenesis exceed the rate of sediment deposition. Thus, these pedocomplex could be an additional stratigraphic marker for regional correlations.

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Keywords

Kazan Volga region, Middle Permian, Paleoclimate, Paleosol, Urzhumian

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